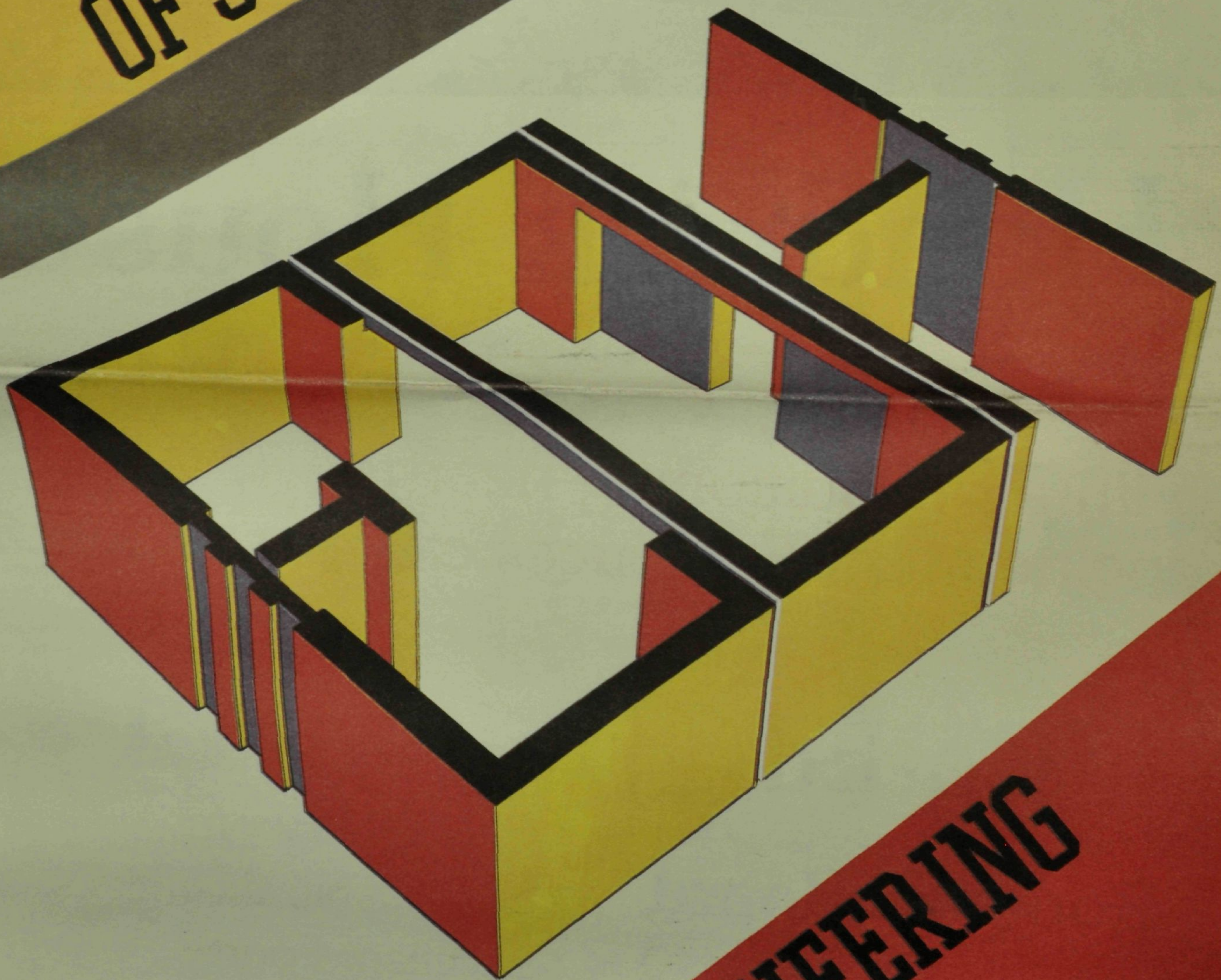


UNIVERSITY OF ILLINOIS

**IN SEARCH
OF SOLUTIONS**

Engineers are constantly searching for solutions to the problems they confront. Developing a solution is more than just finding an answer. It is satisfying an engineer's curiosity about how the problem started and why the solution works. EOH '86 intends to spotlight the many integral steps that occur before potential solutions can be found. Just as a jigsaw puzzle isn't finished until the last piece is placed, a solution is not completed until every detail, no matter how minute, is considered. When visitors leave this year's EOH, they will possess a clearer idea of how the engineering process works and how engineering solutions affect their lives.



**1986
ENGINEERING
OPEN
HOUSE**

FRIDAY, 9:00 A.M. TO 4:00 P.M.
SATURDAY, 9:00 A.M. TO 3:00 P.M.



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WELCOME

An official greeting from M. E. Van Valkenburg
Dean of the College of Engineering

Welcome to the College of Engineering at the Urbana Campus of the University of Illinois. The Engineering Open House is a tradition that stretches back many decades and gives our students an opportunity to demonstrate to family, friends, and the public the excitement that is Engineering. The word excitement very aptly applies to your College of Engineering. The College is going through an invigorating revitalization. We are adding new, young faculty who promise to become the next generation of distinguished engineering educators. We are also acquiring new facilities that will enhance the quality of engineering education.



We have an undergraduate and graduate student body of the highest academic quality and

potential. This is truly an exciting time for your College of Engineering and it gives us great pleasure each year for our students to convey some of that excitement to you.

I urge you to see and hear as much as you can. My hope is that you will come away convinced that your College is fulfilling its role in furthering the education of some of our state's brightest young people who, like the many generations before them, will be prepared to accept leadership roles in industry, government, private practice and University life. This is our great calling and we accept it with enthusiasm.

ENGINEERING OPEN HOUSE

Tours and shuttle buses will depart regularly from the Central Tent. The Central Tent is located on the corner of Burrill Ave. and Green St., right in front of Engineering Hall. Information, schedules, T-shirts, buttons, and various other souvenirs of EOH '86 will be available both days in the Tent.

The Coordinated Project will be located in the third floor of Engineering Hall. The Central Exhibit will be set up in Loomis Laboratory. Tickets for Dr. Zumdahl's magic show will be available at the Hospitality Center outside room 116 Roger Adams Laboratory.

The Saint Pat's Ball will start at the Round Barn Banquet Center in Champaign with cocktails at 6:00 p.m. and dinner at 7:00 p.m. Dancing will begin at 9:00 p.m. and continue until 12:30 a.m. Tickets are available in 300 Engineering Hall they are \$13.00 for both the dinner and the dance, or \$5.00 for the dance alone.



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DEPARTMENT AND SOCIETY EXHIBITS

AERONAUTICAL AND ASTRONAUTICAL ENGINEERING

AIAA
SIGMA GAMMA TAU

Aerospace engineers work in a wide range of fields, some of which might surprise people. It's well known that they design aircraft and rockets, but they are also involved in areas such as terrestrial energy sources (solar, wind, hydroelectric, geothermal), automobile aerodynamics, weather dynamics, combustion, propulsion, and interplanetary mission planning. The projects and exhibits the department has on display reflect this diversity. Many of the projects were designed to give visitors a chance to participate, making them fun as well as interesting. Among the planned projects are the following:

Smoke Tunnel: This newly built wind tunnel uses trails of smoke to trace the flow of air around many different types of objects. Models ranging from airplanes and cars to household items will be tested.

Supersonic Vehicle Design: Several of the projects associated with this topic will acquaint visitors with the realm of supersonic airflow. Included are a water table which can be used to test vehicle design configurations, a working supersonic nozzle and equipment with which to see the airflow, and a supersonic model rocket. Together these projects illustrate the steps involved in supersonic design.

Aileron Model: A working wing segment placed in a wind tunnel will show the basics of aircraft control. Come and get an introductory course in flying.

Planetary Flyby: The focus of this display will be satellites and interplanetary probes which utilize a planet's gravitational field to propel themselves to a final destination. Audience participation is encouraged.

Rikke Tube: Just heating a wire screen produces a loud musical tone due to aerothermal instability. This is an impressive display, both visually and audibly.

Inverted Pendulum: This pendulum refuses to hang normally, but it can be made to come to rest upside down and at unusual angles. This is a must to come see.

Ramjet: This is a working model of a ramjet engine, which will be static tested to show how jet propulsion is achieved.

Aerospace Computer Graphics: Computer aided design is highlighted in this project. Aerospace engineers are among the most frequent users of computers, especially supercomputers, and this exhibit shows some of the ways in which they use them.

Industrial Displays: Aerospace corporations will display aspects and results of their current research and development projects at this exhibit.

NASA Exhibit: This display will illustrate our missions in space as well as what the future holds for space exploration. Learn about the Voyager spacecraft, the Galileo probe, and others. Come and watch the series of NASA movies on many of these topics.

Solar Power: A solar popcorn popper, model windmill, solar cell, and solar water heater are among the exhibits which show how solar power can be converted to usable energy on Earth.

These are only a few of the exhibits which will be on display. Other topics include: solar power platforms, composite materials, prop fans, computer tracking, rescue rockets, a tornado box, and a fantastic space elevator.

No other field of engineering is as broad as aerospace engineering, and no other EOH display is as diverse. Come visit Aerospace Laboratory B and the Woodshop Building for a fun and educational experience.

freshments will be available in the building for all visitors.

Agricultural engineering is the application of engineering principles to the solution of problems in agriculture and industry. The department of agricultural engineering began as a sub-department of the original department of agronomy established in 1899 on this campus. The old facilities were constructed in 1906. The new education and research facility, the Agricultural Engineering Sciences Building, was completed in 1984. The department consists of four divisions: power and machinery, soil and water, structures and environment, and electrical power and processing. The various displays will provide an excellent opportunity to observe the search for solutions going on in the department.

The computer is an important tool in the search for solutions, and for that reason, the computer plays an important role in this year's ASAE Engineering Open House exhibits. The fol-

simulation on the IBM AT computer.

Exhibits and research of soil and water management will be shown, including effects of slope, slope length, tillage practices, residues, and canopy cover on erosion. A laser optical system which is used to detect defects in corn kernels will be on display, along with the rainfall simulator, the hydraulic flume, and other machines and equipment used by the department.

ASAE has planned an interesting and educational display for this year's EOH. They would be proud to show it to all who are interested. Questions are welcome and encouraged! Come on down to south campus and see the undergraduate and graduate research projects and displays in the ongoing "Search for Solutions" in the agricultural engineering department.

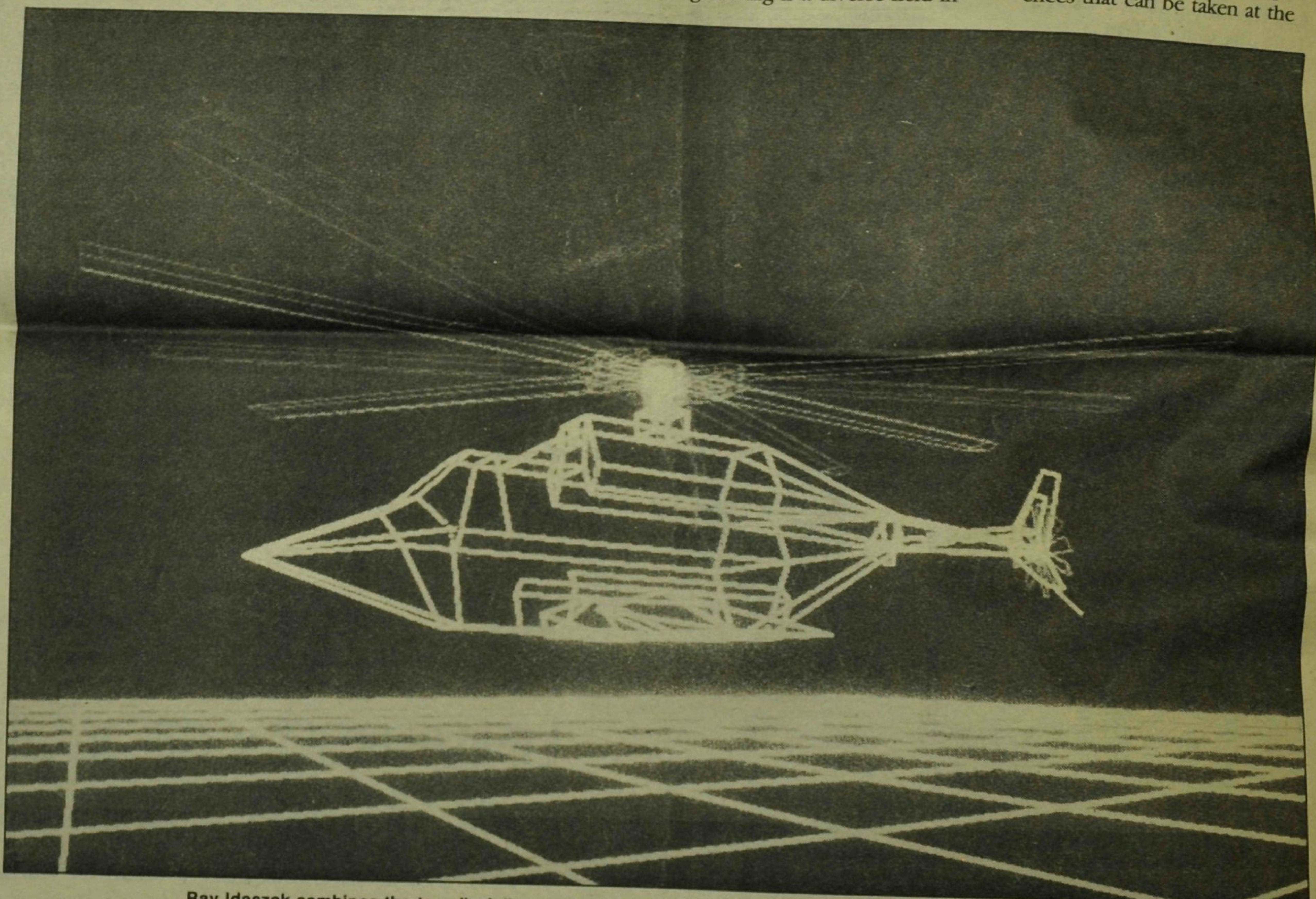
BIOENGINEERING

What is Bioengineering? Bioengineering is a diverse field in-

biological systems and their environments.

In their professional occupations, bioengineers deal with a wide variety of problems. Some of those with advanced degrees in the various fields of bioengineering perform basic research related to biology and medicine in the research laboratories of educational and government institutions or in the medical industries. As biomedical engineers, other graduates work with medical practitioners in the development of new medical devices and instrumentation for manufacturing companies. Clinical engineers work in hospitals and clinics to maintain and improve the vast amount of technological back-up required in modern medicine.

The University has a distinguished record of accomplishments in several areas of bioengineering and these efforts are still expanding. Educational programs in bioengineering are flexible interdisciplinary sequences that can be taken at the



Ray Idaszak combines the two disciplines of computer science and aeronautical and astronautical engineering to produce a simulation of television's Aerowolf helicopter (photo courtesy of Ray Idaszak).

AGRICULTURAL ENGINEERING

ASAE

Once again, the Illinois Student Branch of the American Society of Agricultural Engineers (ASAE) is planning several excellent exhibits for Engineering Open House. The members of ASAE are proud to have been awarded the title of Best Department three times in the last four years and hope that this year's exhibits live up to the standards of past years. As in years past, transportation will be provided between Green Street and the Agricultural Engineering Sciences Building located at 1304 West Pennsylvania Avenue. Re-

lowing exhibits have been developed by students in the department: a computer simulation of tractor performance which uses Nebraska tractor test data to predict tractor performance under various soil conditions, a BSFC contour map program that predicts fuel consumption for a diesel engine under various loads and at various speeds, a computer model of watershed capacity that uses design specifications of actual runoff data to predict volume and flowrate of runoff for small watersheds, and a computer adaptation of programmable calculator routines (done for the U.S. Soil and Water Conservation Service) which determines optimum pipe size for multiple terrace outlets. Other exhibits will include dynamic linkage analysis and

involving the analytical and experimental methods of the engineering profession to bear upon biological and medical problems to achieve a more detailed understanding of biological phenomena and to develop new techniques. The leading contributors to bioengineering are the engineer and the life scientist or medical practitioner, all of whom recognize that certain crucial problems can be treated effectively through the quantitative and analytical approach of the engineer. The engineer's traditional competence in the processing and control of information, energy, and materials, coupled with the ability to design and analyze systems, is a powerful tool in solving biological problems including applications to medicine and quantitative studies of relationships between

undergraduate or graduate level. Besides incorporating every type of engineering, the field also involves biology, biophysics, genetics, medical sciences, physiology, and veterinary medicine.

This year the Bioengineering Society will display many exhibits following the theme "In Search of Solutions." The following projects will be on display:

Artificial Joints and Implants: In this exhibit, artificial joints and implants are displayed and their use in the replacement of non-functioning joints is explained.

ECG Monitor: The Electrocardiogram (ECG) monitor will be displayed and demonstrated.

Ultrasound blood flow detector: In this exhibit, the ultrasound

blood flow meter will be displayed and visitors will be able to use this machine to "hear" and "see" the blood flowing through your arteries.

Audiometer: This exhibit displays a student designed and built audiometer available for public use.

Bioengineering Societies Display: This is an informational display defining the diverse field of bioengineering and outlining the opportunities to study bioengineering at this campus. Handouts and brochures will be available.

Swing Arm Desk for a Wheelchair: In this exhibit, a student-built swing arm desk for a wheelchair will be displayed.

Defibrillator: A cardiac defibrillator is displayed and its mechanism is explained.

Biomechanics: This display shows engineering methods and

Matthews and California. Here one will find the Unit Operations Laboratory, a three-story lab containing equipment similar to that used in the chemical processing industry but on a smaller scale. Visitors will see a rotary filter, a heat exchanger, a demonstration of batch distillation, and many other exhibits.

One major exhibit will be a gas absorption tower in which root beer will be produced. Although industry utilizes a slightly different process for soda pop production, this exhibit will demonstrate the process of compacting liquids and gaseous phase materials, an operation widely used in chemical plants. Also located in Roger Adams Laboratory will be a variety of undergraduate research projects and displays.

Perhaps the highlight of the visit will be the chemistry magic show. This breathtaking adventure into the world of chemistry is unforgettable. The shows will be on Friday and Saturday with

interesting topic. This exhibit consists of structural reactions and the stresses associated with earthquakes and structural analysis of domes.

Close at hand will be the annual "Model Span Contest." This is a competition among University students to build a "bridge" structure out of a given amount of balsa wood and glue. The structures are continuously loaded until failure occurs. The ultimate load at failure is recorded for each contestant's "bridge." Naturally, the student whose structure withstands the largest load wins. For public enjoyment, "bridges" will be loaded to failure throughout the duration of EOH.

Another interesting exhibit in the Crane Bay of Newark will be "Back to the Drawing Board." This exhibit is the effort of Chi Epsilon, the civil engineering honor society. This display consists of civil engineering related methods that have come about

The geotechnical division of civil engineering is always a strong area of interest. Exhibits will consist of a flowing development under dams, failure plane development due to footing loading, and a quicksand display that involves the public at their own discretion.

The hydrology department of civil engineering will be represented in HSL, across from Newmark. A spillway model, water hammer phenomena, computer simulated games for dams and reservoir systems, and an air disc will all be on display. Also located in HSL will be a drainage system for artificial turfs, which is related to the system the Illini play on at Memorial Stadium.

The Associated General Contractors (AGC) will also sponsor the Concrete Cylinder Contest. Entries will be tested for maximum compressive strength. As with the Model Span Contest, the concrete cylinders will be

will prove to be both highly informative and extremely enjoyable. In search of a solution, many students, undergraduate and graduate, are concentrating on several projects. The ECEOH includes projects, tours, and slide shows. Student organizations combined efforts to complete interesting exhibits.

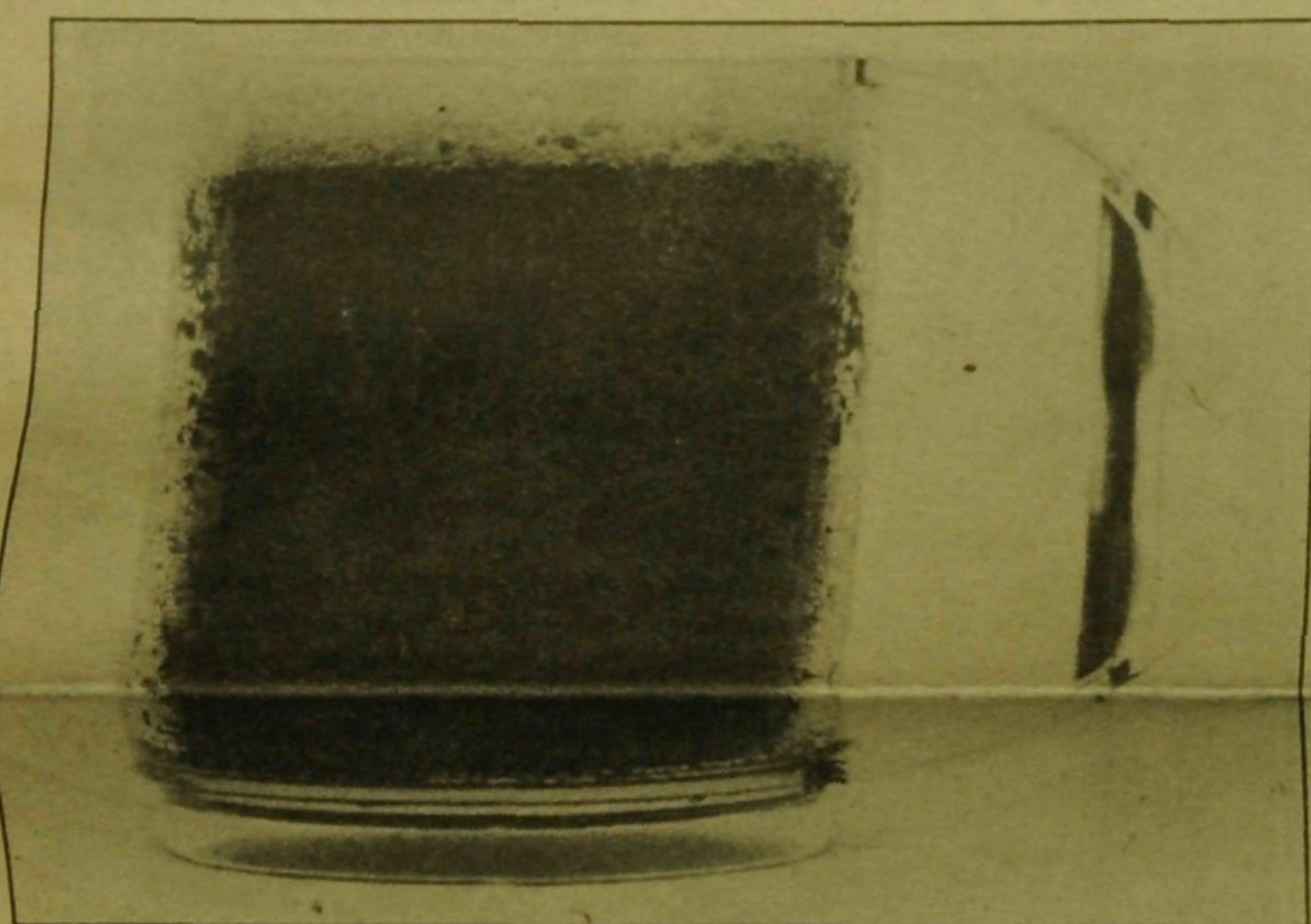
Among the undergraduate student exhibits will be a three-wheel, table-high robot designed and constructed by senior Brian Vaceluke. This robot can operate in tank drive or like a tricycle. It contains two computers, one on board and one off, which communicate through a radio link between them. By EOH, Brian hopes to have ultrasonic distance ranging and speech as features of his robot. Leroy Meyers, also a senior, will scroll messages from right to left across his 5 by 40 matrix of light-emitting diodes. This display will be controlled by a microcomputer. A model train round house controller will be exhibited by Steve Ecker. It will be microprocessor controlled with an electric motor turntable to place trains in various stalls.

The graduate exhibits include a robot arm designed by Sami Zein. This arm will be microprocessor controlled. The wrist and elbow will be controlled by different processors and two motors to move up and down and twist. The shoulder contains a motor to move the whole arm up and down and another motor to rotate the arm around the table. Another graduate student project dealing with flight simulation will be shown by Bob Atac.

The EEOH Committee will be offering activities throughout the Electrical Engineering Building (EEB), as well as projects in other locations. Within the building, the committee will have slide shows each hour on the hour in room 165. The show will include photographs and descriptions of what the electrical engineering curriculum offers to students. Immediately after the slide presentations, lab tours will depart allowing the public a chance to see and learn what happens within the laboratories.

Several organizations will be exhibiting projects within the Electrical Engineering Open House. The Synton Amateur Radio Club will display a packet radio system, a new form of communication which is 100% error free. They also will use a computer to receive and transmit Morse code, show computer teletype, and attempt to communicate with other countries. The Association of Minority Students in Engineering (AMSIE), represented by Ed Allen, will exhibit a robot hand.

The Institute of Electrical and Electronics Engineers (IEEE) will be sponsoring a project showcasing the quickly developing area of electronic speech recognition and synthesis. Both of these use a rapidly developing technology called digital signal processing, or DSP. The project will also incorporate the use



Chemical engineering's search for the solution to thirst is their project describing the production of root beer (photo by Mike Brooks).

technology as applied to the enhancement of sport technique and sport equipment.

Prosthesis: In this display, the historical development of prosthetic devices will be explained.

In this year's EOH, the bioengineering society would like to show the public how bioengineers search for the solutions to today's problems. When visitors leave EOH this spring, the society hopes that they have a clearer idea of how bioengineering works and bioengineering solutions affect their lives.

CHEMICAL ENGINEERING

Chemical engineers are responsible for transforming natural materials into usable products. These include foodstuffs, fuels, pharmaceuticals, plastics, textiles—the list is endless. This is accomplished through the use of various processes utilizing equipment unique to chemical engineering. One can learn more about these processes by visiting the chemical engineering exhibits during Engineering Open House.

Most of these exhibits can be found in Roger Adams Laboratory, located at the corner of

a 25 cent admission fee. Since seating is limited, tickets will be distributed at the hospitality center.

Visitors are encouraged to stop by the hospitality center to rest and enjoy refreshments. Coffee, punch, and donuts will be available. Literature will also be provided by companies sponsoring chemical engineers. The exhibits will be informative and exciting for everyone. The chemical engineering students and staff hope everyone's visit is an enjoyable one.

CIVIL ENGINEERING

AGC
CHI EPSILON

1986 will be a well represented year for the civil engineering department during Engineering Open House. Exhibits will be on display in the crane bay of Newmark Civil Engineering Laboratory, and in the Hydrosystems Laboratory (HSL), as well as on the main floor of Engineering Hall. Approximately seven different areas of interest in civil engineering will be on display or demonstrated to the public to show the diversity and uniqueness of this department.

"The World of Structures" is always a great attraction and in-

through the analysis of natural disasters and failures of man-made projects. The disastrous effects of the Mexico City earthquake will also be discussed.

In the transportation department, cross-sections of different pavements such as city streets, highways, interstates, and airport taxiways will be exhibited along with the different stresses developed on each. A photo display will also attempt to show the actual construction of a city street.

One of the fundamental departments of civil engineering is surveying. Various surveying instruments will be on hand for public demonstration of general surveying techniques.

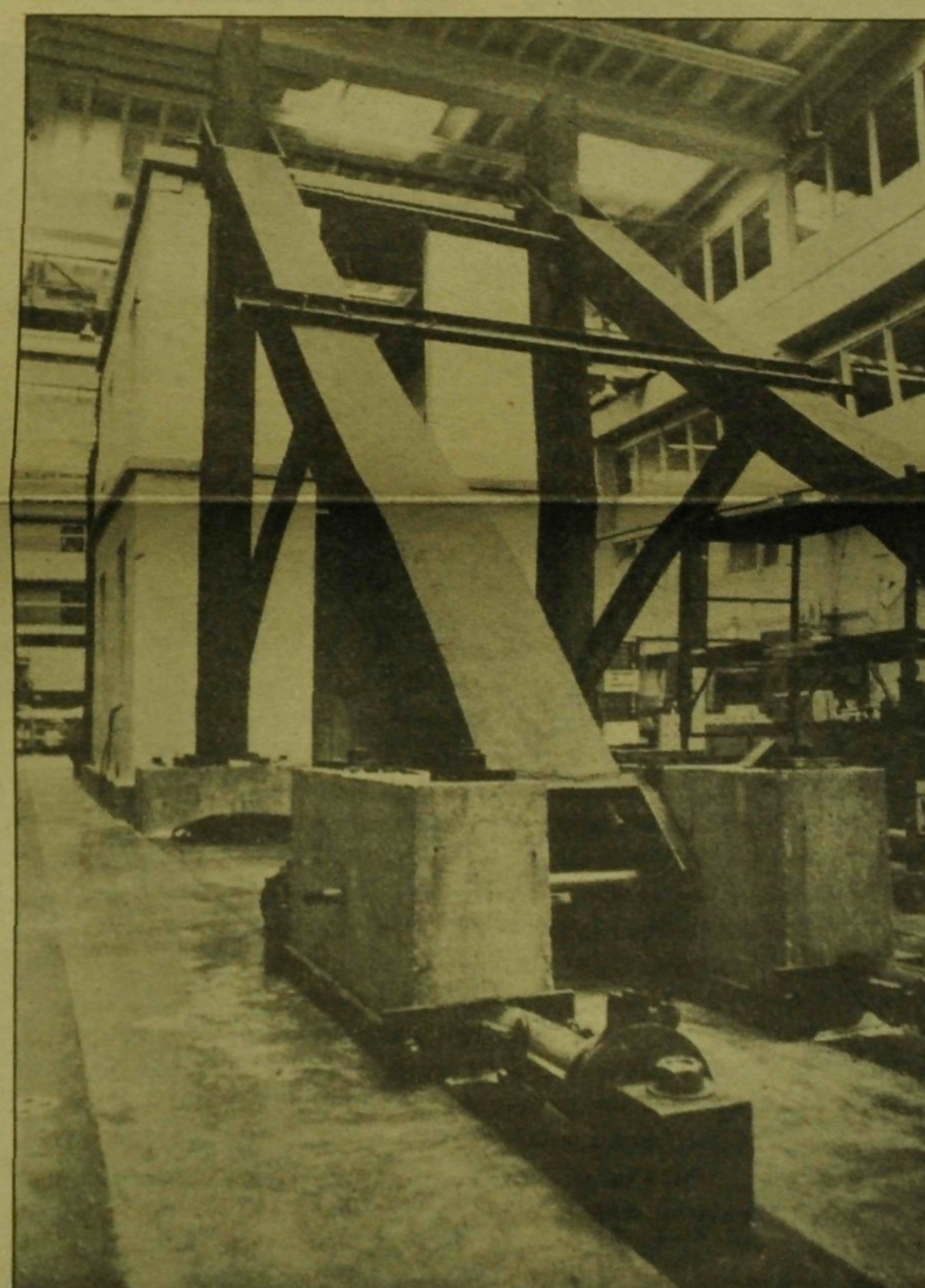
broken every half hour.

The public should find the exhibits and displays to be innovative and of professional quality. Come into the world of civil engineering. As usual, the civil engineering department leads the conquest... "In Search of Solutions."

ELECTRICAL AND COMPUTER ENGINEERING

SYNTON
AMSIE
HKN
IEEE

The 1986 Electrical and Computer Engineering Open House



A full scale model of a two-story building is used to demonstrate the effects of earthquakes on structures (photo by Mike Brooks).

of a microprocessor system and supporting hardware to accomplish this task.

As mentioned, the project uses digital signal processing (DSP). What is DSP? For that matter, what is a digital signal? A signal, as commonly defined by electrical engineers, is a time-varying voltage along a line, wire, or cable that usually carries some information. An analog signal is a direct electrical representation of some real world phenomenon: an analog to the real thing. For instance, a microphone creates voltage waves on its lead wires analogous to sound waves in air. A digital signal may be the coded version of an analog signal, or it could be purely digital data as on computer communication lines. Digital signals differ from analog signals in that they have only discrete voltage levels available to carry information; analog signals have a continuous range of levels available.

Processing of the two types of signals is done differently, also. Analog signal processing uses filters, rectifiers and other purely physical wave-shaping circuits. For digital signals, digital mathematics is performed in the coded signals to accomplish the same result. The processed digital signal is decoded back to analog form if it must interface with the real world, such as through a speaker.

The signal processing in the project will be done with the aid of a microprocessor and two highly specialized signal processing microchips. The microprocessor which will be used is part of an Apple personal computer. It will be programmed to do its processing in low-level language so as to be speedy enough for normal conversation. Its versatility will cut down on tedious, time consuming, error-prone, and costly hardware.

The two specialized chips are a testament to the miracle of very large scale integrated (VLSI) technology. Where transistors were once only found as pea-sized lumps enclosed in tiny metal cans, there are now tens of thousands of them on a chip of silicon no larger than a fingernail, and the metal connections are made right on the chip. A project of this scope would have been unthinkable if the circuitry were not already available in a tidy package.

What these chips can do is as equally astounding as their size. Incorporated in this system, they will both construct speech and understand it. The construction of speech, or speech synthesis, is becoming more and more prevalent in everyday life. The talking cash register and dashboard are two examples. Another is the synthetic directory assistance voice that tells a caller the desired number. There are several ways of accomplishing this. The way this system will work is by synthetically reproducing and stringing together phonemes. Phonemes are the basic units of speech, single sounds. There are approximately fifty in the English language. They will be digitally coded and stored in memory until called

by the program. Then the codes will be strung end to end and converted to their analog waveforms by one of our chips and finally put through a speaker. The result is recognizable speech, one phoneme at a time, just like humans do it.

Speech recognition is another process and quite a bit more complex. So much more so that there are very few systems today that can understand more than ten words when spoken by anyone. Our system will be trained, therefore, to respond to only one person's voice, and to a limited vocabulary. The second specialized chip will do the recognition based on two training sessions for each element in its vocabulary. The training sessions let the chip create a template or pattern to which incoming patterns will later be compared. These patterns are quite distinct to a person's voice, so the system will recognize only one speaker.

As yet, speech recognition has

The system will ask for the spelling of a word and the test taker will reply verbally. The system will then evaluate the taker's reply and state the result.

This year Eta Kappa Nu, the EE honor society, will be displaying a comprehensive study of lasers and holography.

Although both lasers and holography have been in existence for over twenty-five years, the effect on our daily lives of this technology is only now becoming apparent. Lasers are being used in conjunction with fiber optics to transmit messages over telephone systems. In audio technology, lasers are being used in Compact Disc (CD) players. Still, another use of lasers and holograms is in the supermarket. Here, lasers are used to read the price tags of grocery items. Another place for lasers and holography is in the military. While the new Star Wars policy has highly publicized possibilities of using lasers to destroy attacking missiles, there are

lasers and holography and that new potential uses of the technology will be brought out.

The display will consist of eight different subject areas in laser optics. For each subject area there are two goals. The first goal is to investigate some possible uses of lasers and holography in society. The second goal is to help educate the public about lasers and what they mean to society.

Companies will also be participating in ECEOH. Among them is Zenith which will have several displays in room 161 EEB. They are planning to show their new Hero 2000 robot, which was just announced in December, and their microcomputers.

Those searching for a solution themselves should visit the Electrical and Computer Engineering Open House. It promises to be an intellectual experience as well as an enjoyable adventure.

stand out: a comprehensive program in the basic and engineering sciences, a secondary field of concentration in either engineering or other fields, allowing the student flexibility to create a personalized educational program, and a sequence of five engineering design courses, providing an integrated and interdisciplinary approach to technical problem solving.

Graduating students pursue careers in an ever-widening spectrum, including engineering management/marketing, environmental quality, mining and geological engineering, computer science, robotics, bioengineering, control systems, and even manufacturing. Students have also gone on to careers in law and medicine. Thus, general engineering is the ideal choice for the student with diverse career goals.

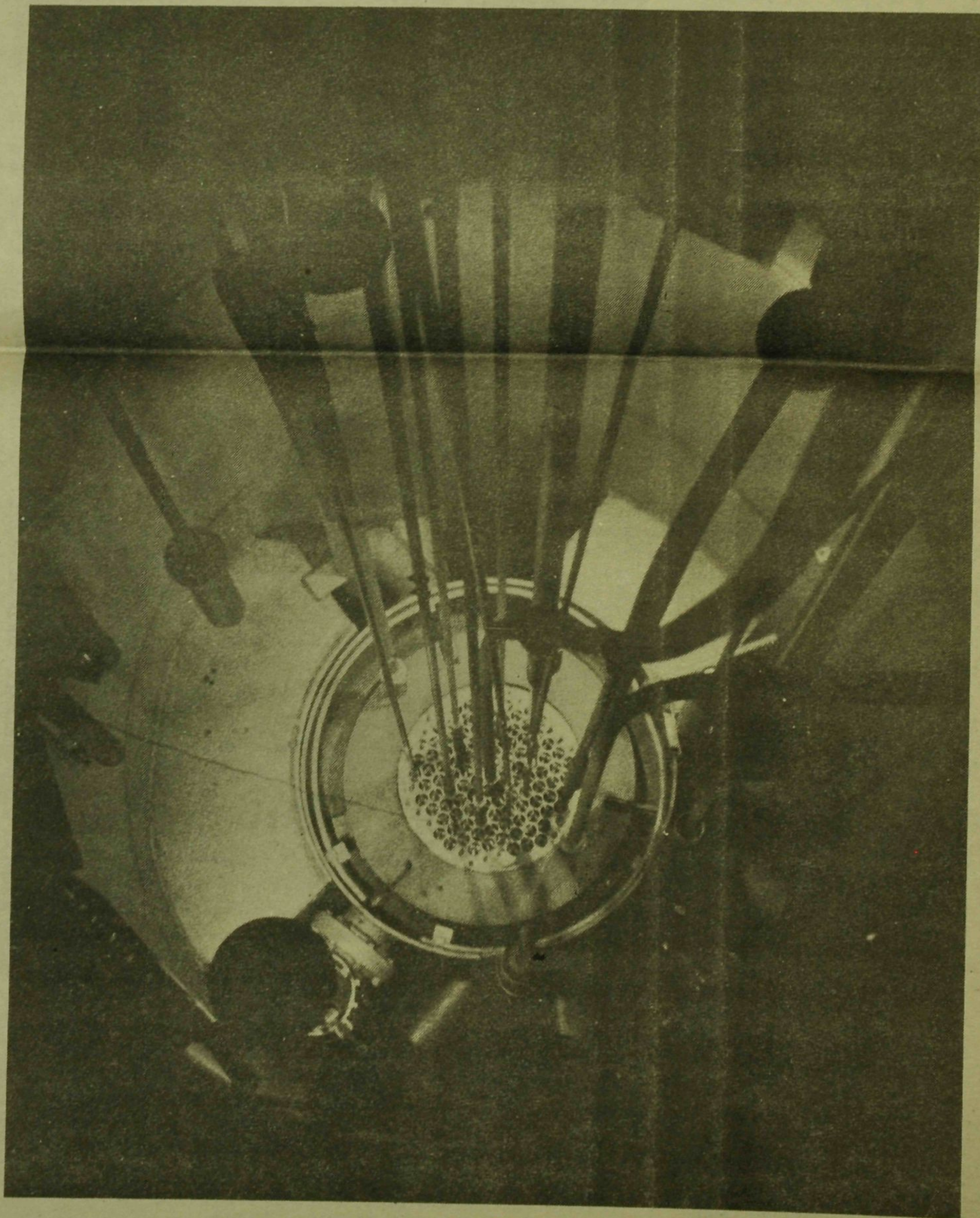
This year's General Engineering Open House promises to be the most enlightening ever! Many new exhibits have been designed to demonstrate the processes by which general engineers search for solutions. State of the art AutoCAD (Computer Aided Design) programs and equipment will be demonstrated. A widescreen sound and light show (using an IBM-PC with enhanced graphics monitor and projection capabilities) will be used to explain what the visitor will see in the department's all-new computer labs. The roots of computing will be shown using a rare analog computer working on control system problems. A microcomputer lab will be conducting a hands-on singalong, which will be a lot of fun for young and old alike!

The theme of EOH '86, "In Search of Solutions" will be shown by the evolution of GE 103, one of the most popular classes on the engineering campus. Approaching the problem of depicting a three-dimensional object in two dimensions, several solutions used by engineers will be demonstrated as they are taught to freshmen. These solutions range from traditional drafting techniques to modern computer graphics.

Applications of general engineering to be demonstrated include design work on Indy 500 race cars. An actual chassis will be available for visitors. GE's work in bioengineering can be seen in a CAT scan exhibit. Other applications will be shown as well as several exhibits to teach visitors more about general engineering as a whole. The amazing diversity of the department will become evident as the visitor tours the Transportation Building on Matthews Avenue.

The general engineering department's efforts this year have been coordinated and sponsored by the student organizations of the Illinois Society of General Engineers (ISGE) and Gamma Epsilon, the GE honor society. Come see the displays we have assembled, as they promise to be entertaining as well as informative!

General engineering (GE) is the most unique curriculum offered in the college. Three particular strengths of the general engineer



The University's Advanced Triga Reactor hallmarks research in nuclear engineering (photo by Mike Brooks).

very few applications because of these limitations. A working system with a large vocabulary would, however, have a staggering variety of applications, from aiding the disabled to the eventual replacement of the keyboard.

The format of the project should make it entertaining. It will be in the form of a spelling quiz.

many more military uses of lasers which are not publicized and in some cases kept secret.

Even though lasers and holography are becoming increasingly important in today's society, little effort has been made to educate the public about lasers and what they can do. In this display, it is hoped that some of the mystery will be taken out of

GENERAL ENGINEERING GAMMA EPSILON ISGE

General engineering (GE) is the most unique curriculum offered in the college. Three particular strengths of the general engineer

ILLINOIS TECHNOGRAPH

The *Illinois Technograph* will be soaring high above the rest at the 1986 Engineering Open House, as they kick off the greater Illini Kite Fly.

Kite-fly central will be 113 Transportation. Those with kites already prepared may immediately register and head out to Illini Field to show off their design. Don't have a kite but still want to get involved? Don't worry, because the *Technograph* will supply the materials required to get your design off the ground. Just want to sit around and watch? Stop in at 113 Transportation, before heading to Illini field, and check out our exhibit which will include kite history and why kites perform the way they do.

By the way, you really should register your design, because they will be judged. Not to wor-

dizzing heights. Rain or shine, a splendid time is guaranteed for all.

INDUSTRIAL ENGINEERING ALPHA PI MU

IIE

As an industrial engineer, one is concerned with performance measures and standards, research of new products and product applications, ways to improve the use of scarce resources and many other problem-solving adventures. Industrial engineers are at the center of productivity improvement as they are "In Search of Solutions" for higher quality products, more customization, and minimal production costs. This is to be accomplished without waste of physical and human resources while maintaining the environmental balance. In order to meet such broad objectives, in-

In the area of manufacturing, industrial engineers are responding to industry's call for increased productivity by developing and applying more computerized automation. They are capable of accomplishing this through robotics and computer aided design and manufacturing (CAD/CAM).

Human factors and time and motion study focus on the worker's safety, well-being, and output through the elimination of potentially hazardous conditions. Human factors is a rapidly growing field because of the desire to improve worker performance in order to benefit the worker and the company through increased production. Human factors, or ergonomics, concentrates in physiological considerations and safety in human-machine systems. The principles of ergonomics are used extensively in the design of airplane cockpits. The flight simulator currently being used in a joint industrial engineering, aviation, and psychology research

"productivity people" who must provide leadership and integrate technology. IE's include the human factor in finding workable, effective solutions to production problems while retaining high standards of quality.

At the 1986 Engineering Open House, the industrial engineering department will display projects that are representative of the major areas of industrial engineering with the help of the student chapter of the Institute of Industrial Engineers and the Alpha Phi Mu Honor Society. No challenge can be greater than that of improving productivity: the application of knowledge and skills to provide improved goods and services to enhance the quality of life, both on and off the job.

loose to create the interesting robot programs presented this year.

Besides projects presented by classes, all of the societies in the ME department will be presenting their projects. ASHRAE will be showing a new heat pump, combined with a computer simulation of a home heating system. The Society of Automotive Engineers (SAE) will present the latest in automobiles from Detroit, complete with factory representatives to answer any questions. The exhibit will also feature a bicycle dynamometer and SAE's competition vehicles.

The American Society of Mechanical Engineers (ASME) will again present their ever-popular



The Talbot Lab crusher swings into action every hour on the half hour, displaying concrete block testing (photo by Steve Lotz).

ry if your kite won't leave the ground, since our panel of experts, the *Technograph* editorial staff, will judge them for originality. To keep things square, designs built on-site will be judged separately from pre-built ones.

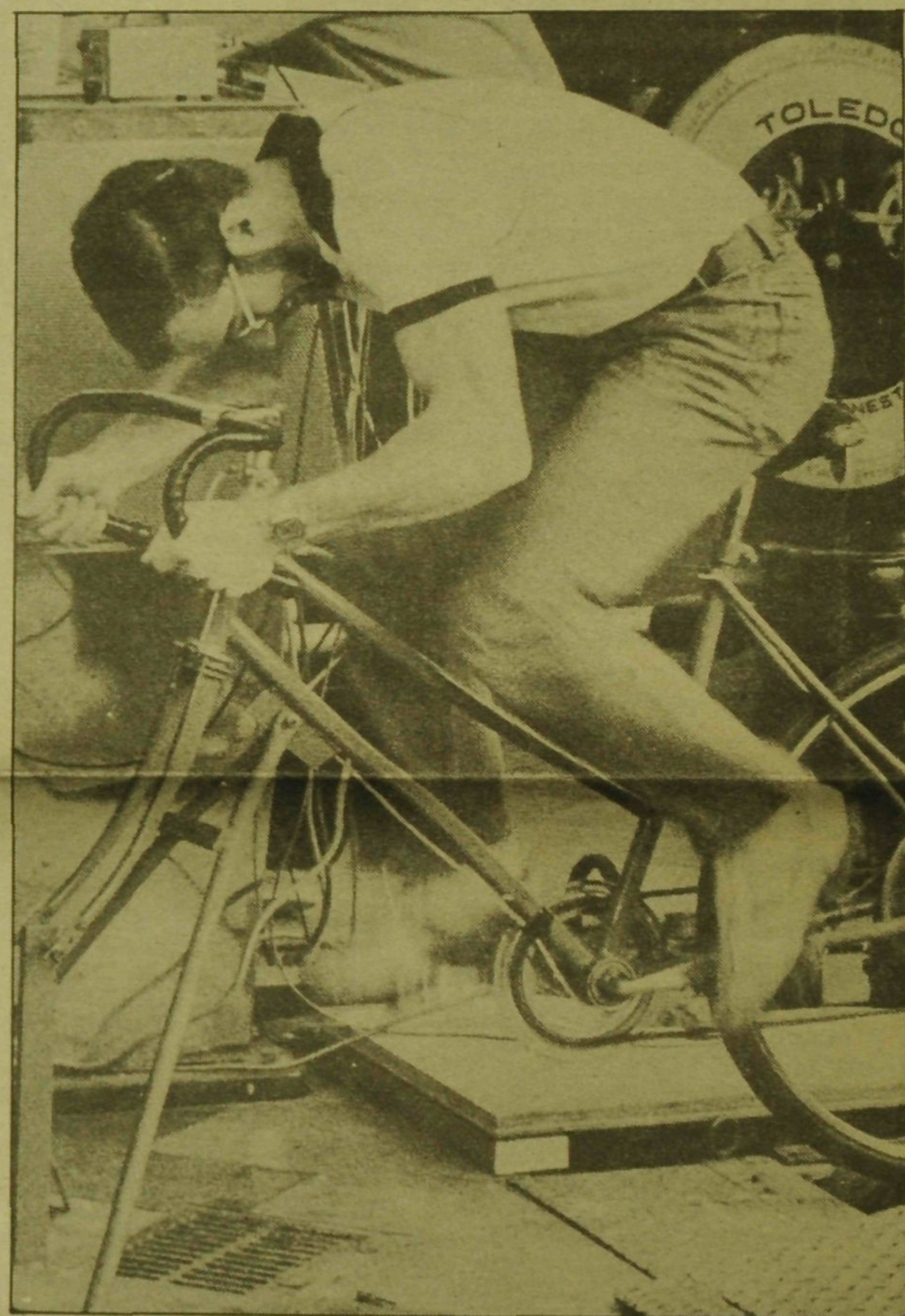
So start thinking spring: with a light breeze and sunny skies, the greater Illini kite-fly may reach

dustrial engineers specialize in operations research, manufacturing, human factors, and quality control engineering.

Operations research, in simplest terms, involves the optimal allocation of resources. Much of the work done in this area involves computer simulation of actual problems and situations.

project will be operated several times during EOH.

Quality control, the use of statistical methods to keep a process under control, is of vital importance to industrial engineers. Competition from foreign industry has given U.S. industries an incentive to insist upon improved quality and productivity. Industrial engineers are the



The Society of Automotive Engineers will present an exhibit which demonstrates the human body's ability to generate power

MECHANICAL ENGINEERING

ASME
SAE
ASHRAE
SEG

ASME Design Contest in which students are supplied with a variety of materials with which to design a vehicle to be propelled over a course. The society is striving to encourage further student involvement. The entrants compete for the best time in order to obtain one of a host of prizes.

This year the mechanical engineering department will present an interesting and captivating array of projects that cover all aspects of this year's theme, "In Search of Solutions." In accordance with the theme, ME 270 students will assemble their "Host of Ingenious Mechanisms." The students were provided with the purpose of the apparatus and the corresponding design criteria.

Along with the ME 270 students, the students in ME 275 will present a project that deals directly with robotics. The students were again given the essentials for the development of the project, and then set

The Solar Energy Group (SEG) will present the debut of the new Solar Energy Laboratory, complete with solar panels on the roof of the Mechanical Engineering Building.

The foundry and the Mechanical Engineering Lab will again be used to show off casting, masking, and metal pouring processes and current lab activities throughout the department. Finally, the materials lab in the basement of the ME Building will present current materials testing.

technology? The mechanical engineers of the University cordially invite you to visit their interpretation of "In Search of Solutions."

METALLURGY AND MINING

Take a quick glance at the things surrounding you. Have you ever wondered what those "things" were made of, how they were produced, or what characteristics they exhibit? If so, you've delved into one or more questions that concern a metallurgical engineer. The role of the metallurgist is to apply his or her understanding of the properties of these materials, whether they are steel, titanium, silicon, or polyethylene. Such properties depend not only on the material's composition but also on its processing history. Thus, by varying a material's composition or method of processing, the metallurgist is able to control these variables and the complex structural and mechanical properties.

The department of metallurgy at the University consists of approximately twenty faculty, ten post-doctoral researchers, 110 graduate students, and eighty undergraduate students. The academic interests of the faculty range from materials processing through welding, laser-annealing, sputtering, and sintering to materials characterization by x-ray diffraction, light microscopy, and electron microscopy plus the measurement of mechanical, electrochemical, and electronic characteristics of experimental materials. The types of careers available to graduates in the metallurgy field include those in high-tech areas such as the aerospace, nuclear, electronic materials, and manufacturing industries, as well as the traditional jobs offered in the construction metals and heavy equipment industries.

This year's EOH exhibits have been selected to span the cross section of applied metallurgical technology, ranging from basic processes which have been used for decades, to those which are still experimental in nature. Basic processing methods will be demonstrated, such as the techniques and results of metal fabrication by means of casting and forging. The spin casting exhibit, an annual favorite, produces a strong ribbon of solder wire which is propelled across the room, often accumulating in the light fixtures, movie screens, and window sills of 100 Metallurgy and Mining Building. The forging exhibit shows how many metal tools and instruments were produced before the advent of modern day machinery. Another interesting display explains the fabrication processes necessary for the production of various metal cans.

One of the metallurgist's more common responsibilities is in the testing of materials. Thus, several of the classical tests of mechanical properties will be demonstrated, including the uniaxial tensile test for measuring yield strength and the Charpy impact test for evaluating fracture toughness. In addition, several non-destructive test-

ing (NDT) techniques, such as ultrasound and radiography, will be on display.

Two special projects that represent good examples of metallurgical phase transformations are entitled "Passion Metal" and "Shape Memory Alloys." The passion metal undergoes an exothermic transformation that deposits its heat into the hand of the unwitting spectator. The shape memory alloy "remembers" its former shape after disfiguration.

An exhibit on thin film surface coatings exemplifies the forefront of metallurgical technology. Several products of this type, such as titanium wear-coated tools, will be shown and their processes explained.

NUCLEAR ENGINEERING

The University's nuclear engineering department studies ways to use nuclear power to benefit mankind and provide power to an energy-hungry world. During Engineering Open House each spring, the department opens its doors to show the public the fruits of its efforts. Projects being shown will demonstrate the principles of both fission and fusion energy and will also show other uses of nuclear energy.

One part of EOH that interests many people is the opportunity to visit the department's working nuclear reactor, the TRIGA Mark-II research reactor will once again be open for tours. The tour will feature a visit to the reactor's control room and an opportunity to stand on the reactor and watch it work. Tour groups will assemble in the lobby of the Coordinated Science Laboratory. Other exhibits in this building will include a demonstration of radiation monitors and will display some common sources of radiation that may even be in your home!

Another area of displays will be located across Goodwin Avenue at the Nuclear Radiation Laboratory. The "theta pinch" will use principles used in fusion research in unconventional ways. Experiments from lab courses will also be displayed to show the "hands-on" side of the nuclear engineering curriculum.

Sandwiched between the Transportation and Ceramics buildings is the heart of our department, the Nuclear Engineering Laboratory. A slide show of the department and its current research will be presented on the second floor.

The nuclear engineering department invites you to stop by and see us "In Search of Solutions."

PHYSICS

Physics, once known as the philosophy of nature, is a discipline which searches for a better understanding of the universe so that people can better relate to their physical world. Physics is not something commonplace or

specific; it includes the very extraordinary and overlaps with many fields. This most basic science is the tool which helps all engineers and scientists in their search for solutions to the many problems which are posed daily.

This year the Physics Society welcomes visitors to come view and enjoy some of the varied demonstrations and displays set up in Loomis Laboratory. Among them will be the famous freshmen lecture in room 141 which will be given many times daily. It makes use of many of the more interesting lecture demonstrations sitting in the back rooms of Loomis. All sizes of interesting and unusual physical and optical set ups can be seen in the halls. They include a four story Foucault pendulum, fun with liquid nitrogen, an optical display including holograms, displays dealing with simple electronics, and much more. Some of the new uses of computers in the classroom will also be on hand. A few rooms will be open for films and many other exciting demonstrations.

So come out, take a look, ask some questions, and get a better feel for how physics helps in our search for solutions.

SOCIETY OF WOMEN ENGINEERS

The Society of Women Engineers (SWE) is a professional, non-profit educational service organization of undergraduate and graduate students, and those in the engineering profession, both male and female. The Society was founded in 1949-50, incorporated in 1952, and has a membership of over 15,000 men and women. SWE student sections exist at over 200 colleges, universities, and engineering institutions in the United States, the District of Columbia, and Puerto Rico.

The specific objectives of SWE are to inform the public about the qualifications and achievements of women engineers, reveal some of the opportunities for women in engineering, and to encourage women to attain high levels of education and professional achievement.

Here at the University, SWE has over 165 members and fulfills these objectives through various activities and services. These include monthly meetings, speakers, plant trips, newsletters, conferences with other chapters, social activities, an automotive workshop, banquets, scholarships, graduate advisors, an industry file, and contact with SWE alumni. High school girls are introduced to engineering and the University through a high school weekend. Employment opportunities are introduced through a resume book and by a job fair held at SWE's Technical Career Night.

Every year SWE participates in EOH. This year SWE presents "The GameSWE Play." Games are not only sources of enjoyment and amusement, but are tools used to solve problems and develop our minds. The dis-

play traces the history and development of games. Included in the display are examples of word games, board games, mechanical games, electrical games, and computer games; all of these can be used to search for a solution to a problem from simple to complex. A game designed by SWE members uses simple mechanical devices to solve and to answer common questions.

Stop by 153A Mechanical Engineering Building to see how games can be fun, as well as being useful tools for problem solving.

TAU BETA PI

Tau Beta Pi, the national engineering honor society, recognizes engineers who display both superior scholarship and exemplary character. Dedicated to the overall development of its members, Tau Beta Pi strives to encourage students with their technical education as well as to increase their sense of responsibility to the community.

The Illinois-Alpha chapter of Tau Beta Pi is constantly "In Search of Solutions" to the questions commonly facing engineers. In addition to Engineering Open House, the chapter projects include freshmen/sophomore help nights and tutoring service, job fairs to assist students in making their career decisions, and conferences to discuss the intertwined roles of students, administrators, and the government as a whole.

Taking a slightly unique approach to this year's theme, "In Search of Solutions," Tau Beta Pi offers everyone a taste of our "Savory Solutions." With the touch of a single button, an automated bartender will serve visitors their choice of drinks from a preprogrammed menu. Each drink will be, in general, a solution of several fruit juices. Solutions are homogeneous mixtures of a predominant liquid containing dissolved solids, gases, or in this case other liquids. These solutions cannot be separated into their constituents without using chemical methods, as opposed to a mixture of, say, different colored pebbles.

Electronic valves will be used to dispense the proper amount of each juice into the glass. These valves will be connected to the bartender's motions through a computer to prevent any spills. Come searching for some refreshing solutions in the student lounge, room 123B of the Metallurgy and Mining Building.

THEORETICAL AND APPLIED MECHANICS

The department of theoretical and applied mechanics (TAM) offers more than just basic courses in statics and dynamics. Advanced courses are taught in areas such as materials, fluids, and applied mathematics. Engineering mechanics is the basis

for many engineering disciplines; it links science and engineering. This curriculum is especially suitable for those students who are interested in science and mathematics, yet who still wish to work on practical engineering problems.

The undergraduate program in engineering mechanics consists of five areas of study: experimental mechanics, engineering science, biomechanics, materials engineering, and computer applications. Students in these programs take core mechanics courses and then specialize during their junior and senior years to tailor a program to fit particular interests. Seniors are required to work on a research project related to their area of specialization.

Each senior works individually with a faculty member on an actual engineering problem. This gives students an opportunity to apply their education to engineering research. Posters and some demonstrations of current senior projects will be displayed throughout Talbot Laboratory during EOH.

Other EOH exhibits include the fluids labs, a laser-welding demonstration, a knot-breaking contest, materials testing labs, and of course, the concrete crushing exhibit.

The fluids labs in rooms 126 and 129 of Talbot Laboratory will have demonstrations of various flows including a hydraulic jump, a water table, and a water flume. A stroboscope exhibit will show flows appearing to stand still or move in slow motion.

In room 1 of the The Materials Engineering Research Laboratory (MERL) will be a display of various testing machines. A scanning electron microscope will also be demonstrated.

Room 220 MERL will be a busy place. Experimental stress analysis methods, including photoelasticity, strain gauges, and brittle coatings will be displayed, as well as dynamics exhibits, and a knot breaking contest. Visitors will be given an opportunity to tie a knot on a testing machine and then see how much load it carries.

The crane bay will have two demonstrations going on: the concrete cylinder crushing and laser-welding. Every hour on the hour, a laser beam will be used to weld two pieces of steel.

Be sure to drop by Talbot Laboratory during EOH and see all the things that TAM has to offer.

COORDINATED PROJECT

This year, the coordinated project for Engineering Open House will expand on last year's theme of food production for the future. The project will contain displays featuring different aspects of food production. Subterranean irrigation and drainage, automated feeding of livestock, new technology in pasteurization and hydroponics will be the subjects of some of the exhibits.

The new technology in pasteurization involves processes which do not require cooling of the pasteurized product and allow the product to have a longer shelf life. The hydroponics exhibit will show how plants can be grown in media other than soil. Also, an extruder, used in the mass production of food products, will be displayed. According to Bill Brown, senior in Agricultural Engineering and project chairperson, the extruder may be used to demonstrate the making of cheetos if the needed materials can be obtained.

Brown and co-chairperson Patrick O'Neill said that food production for the future was selected as the topic so that many fields of engineering would be involved in the project. Also, by repeating last year's topic, work already done could be displayed and added to and new projects could also be developed. The previous project, a space station, followed the same format.

Work on the project was done entirely by students with each exhibit being approached separately. While University professors were consulted, they did not direct the project. Companies from food production related areas such as the Archer Daniels Midland Corporation and Advanced Drainage Systems provided materials and information for some exhibits.

All exhibits will be displayed together except for the extruder which, according to Brown, is too large to be moved from its present location at the Agricultural Engineering and Science building. The tentative location for the project exhibits is 300 Engineering Hall.



This year's Coordinated Project concerns food production (photo by Mike Brooks).

Jeffrey Dobos

CENTRAL EXHIBIT

The search for solutions is as old as the age of man. Yet, some of those old problems still remain. The ancient problem of feeding the world's population still plagues us to this day. Fast communication of ideas, first solved by the printing press, is still a problem. We still need a faster, more dependable, and more accessible communications system. Satellites help, but problems with costs, noise, control, and placement in Earth's orbit keep engineers of all disciplines busy in design and support. Thus, new technology solves problems created by the technology before it.

Comparison of the old technology with the new is the main idea of this year's EOH Central Exhibit. The title "Spectrum of Technology" aptly describes the colorful range of activity at the Loomis Laboratory exhibit site. Inside the main hallway, participating engineering departments demonstrate old solutions in conjunction with new solutions to various engineering problems.

Some departments make this comparison by directly showing the development of a single concept. The mechanical engineering department does this by tracing the history of the modern, hand-held calculator back to

the bulky and slow adding machines. Along the same lines, the nuclear engineering department shows the increasing sophistication of x-ray machines from the earlier radioactively dangerous ones to the new, safe, versatile ones that have thousands of applications other than in medicine. The agricultural engineering department continues in this vein showing the development of harvesting equipment. Also included is a demonstration of the improvement of artificial limbs over the years conducted by the bioengineering department.

Other departments show the de-

velopment of general concepts. For instance, the chemical engineering department traces the long history of important concepts in its discipline. Related to that is the department of metallurgy and mining's history of polymers. The important general concepts of stress analysis are shown historically by the department of theoretical and applied mechanics.

Three more departments complete the exhibit. One is the civil engineering department demonstrating the strides made in purifying drinking water. Also, future plans in water treatment are given. Another, the ceramic

engineering department, demonstrates how a toughening mechanism for ceramics can inhibit fracturing. Finally, the physics department contrasts present teaching methods for freshmen in mechanics to traditional methods.

The chairman of the Central Exhibit, Todd Swikel, has organized an interesting and educational exhibit. Be sure to check it out.

ST. PAT'S BALL

Every year Engineering Council closes EOH with St. Pat's Ball, a semi-formal dinner-dance. This year's Ball will be held on Saturday, March 8, at the Round Barn Banquet Center in Champaign. Highlights of the night will be the distribution of EOH awards and the knighting of the Knights of St. Pat.

The event will begin at 6:00 PM with cocktails, followed by a roast beef dinner at 7:00, and dancing from 9:00 to midnight. The band "Altogether" will provide musical entertainment.

Tickets for the event cost \$13.00 per person for the dinner-dance and \$5.00 for the

dance only. It is not too late to buy tickets. They will be sold today on the first floor of Engineering Hall, and tomorrow and Saturday in the EOH tent.

The annual EOH awards will be presented at the banquet, including prizes for best exhibits. The Engineering Council best society awards will also be distributed. Probably the most interesting event of the night will be the "knighting" of the Knights of St. Pat. Candidate knights are nominated by their engineering societies and departments. Only a small number of the nominees receive the coveted award, which is intended to reward extraordinary con-

tributions to the engineering departments, college, or profession. This year's Knights are: Anette Drilling (GE), David Griffith (AgE), Terence Koritz (ME), Jennifer Lewis (CerE), Karen Lindholm (EE), Marcia McCutchan (AgE), James McDowell (ME), Mary McDowell (CS), Eric Messerschmidt (EE), Patrick O'Neill (ME), Ruta Sidrys (GE), Joan Tak (MetE), Joel Vanden (TAM), Janet Van Valzah (CerE), Dick Welch (CompE), and Timothy Yao (CE).

The Engineering Council Social Affairs Committee was responsible for the planning and organization of the Ball. For more information contact Mary Simms, Social Committee chair for Engineering Council and emcee of the Ball, at 333-3558 or in 300 Engineering Hall.

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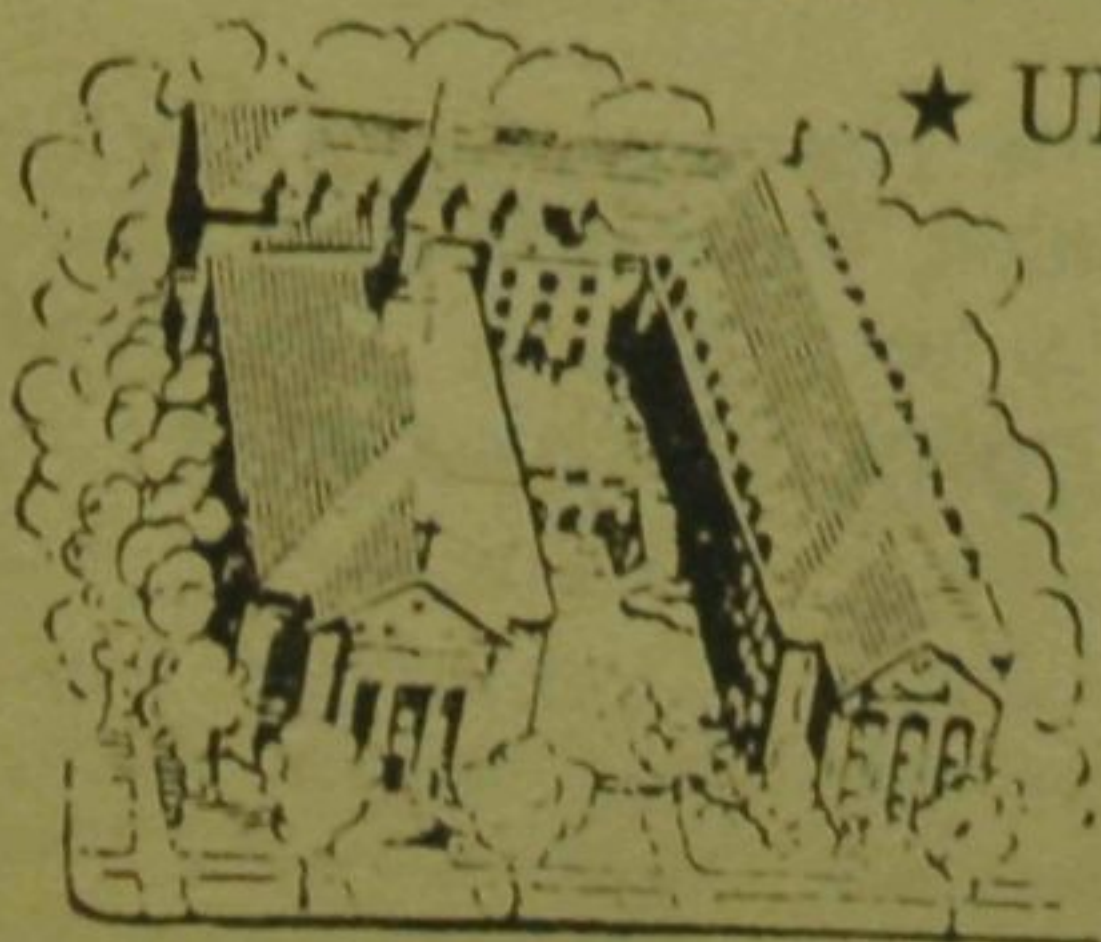
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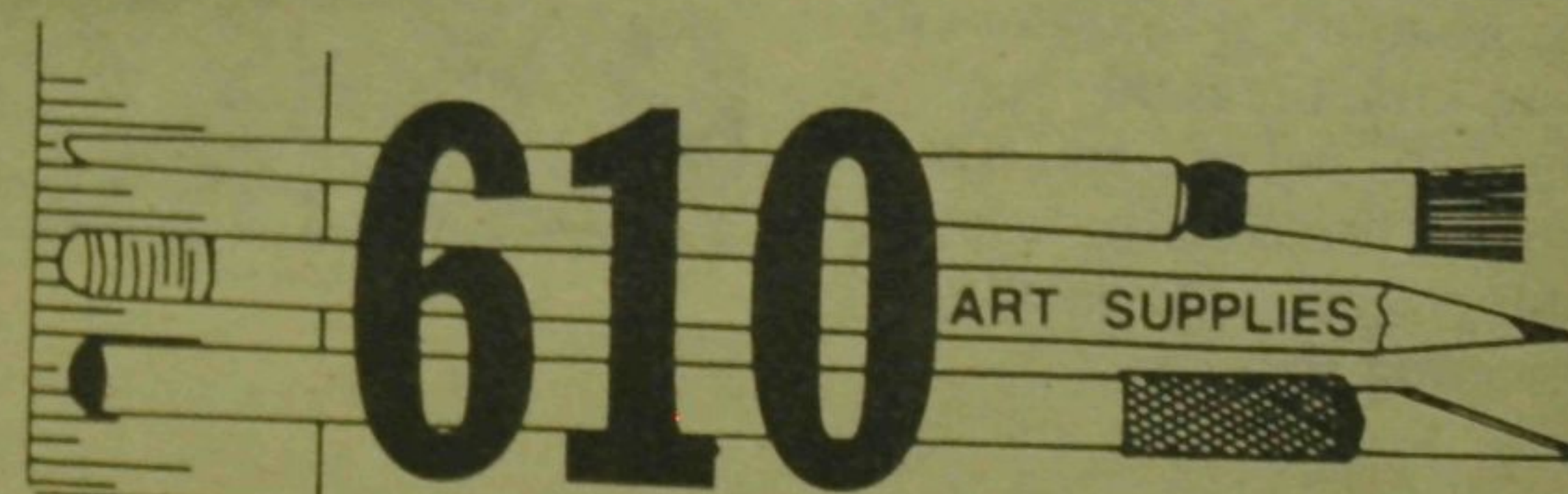


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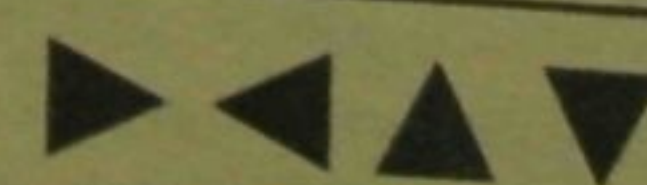
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A special thanks to the Industrial Engineering Coordinating Committee:

Mike Harty
Carolyn King
Jill Kollath

Professor Shiv G. Kapoor Faculty Advisor

And the I.E. students and faculty who contributed to the success of this year's I-EOH.

Karen Lapinski

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Bill Brown Chairman, Coordinated Project

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Marc Heien

Laurie Taylor Posters and Programs Chair

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EOH Central Committee

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Karen Lindholm Chairman

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and especially
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John Endsley
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